

What Is Claimed Is:

1. A position measurement system comprising:
 - a light source;
 - an optical lens system which transmits light from the light source and forms an area of light concentration due to its spherical aberration;
 - a light receiving device which detects the area of light concentration as formed by the optical lens system; and
 - a calculator which measures a position of the light source according to detected information on the area of light concentration as detected by the light receiving device.
2. The position measurement system according to Claim 1, wherein the area of light concentration has a shape of a ring.
3. The position measurement system according to Claim 1, wherein the optical lens system includes a convex lens having a first surface for light entrance and a second surface for light exit, the first or second surface is a spherical surface with a curvature radius R , and a diameter of the lens, ϕ , is $R/4$ or more.
4. The position measurement system according to Claim 3, wherein a thickness of a center of the lens is equal to or larger than the curvature radius R .
5. The position measurement system according to Claim 4, wherein the lens is a semispherical lens in the form of a semispherical body as obtained

by halving a spherical body or part of a semispherical body, and its first surface is flat and its second surface is spherical.

6. The position measurement system according to Claim 1, wherein the area of light concentration has a shape of a line.

7. The position measurement system according to Claim 1, wherein the optical lens system includes the convex lens having the first surface for light entrance and the second surface for light exit, and the first or second surface is a cylindrical surface with curvature radius R .

8. The position measurement system according to Claim 1, wherein the optical lens system includes a lens having a first surface for light entrance and a second surface for light exit, and the first surface is a concave surface and the second surface is a convex and spherical or cylindrical surface.

9. The position measurement system according to Claim 1, wherein the optical lens system includes the lens having the first surface for light entrance and the second surface for light exit, the first surface is a convex and spherical or cylindrical surface and the second surface is a flat surface, and the light receiving device is tightly attached to the second surface.

10. The position measurement system according to Claim 1, wherein the optical lens system has a spherical lens, a cylindrical lens or a barrel lens.

11. A position measurement system comprising:
a light source;
an optical mirror system which reflects light from the light source and forms an area of light concentration due to its spherical aberration;
a light receiving device which detects the area of light concentration as formed by the optical mirror system; and
a calculator which measures a position of the light source according to detected information on the area of light concentration as detected by the light receiving device.

12. The position measurement system according to Claim 11, wherein the area of light concentration has a shape of a light ring.

13. The position measurement system according to Claim 11, wherein the optical mirror system includes a spherical mirror with a curvature radius R and a diameter of the mirror, ϕ , is $R/5$ or more.

14. The position measurement system according to Claim 1, wherein the light source is mounted in a moving body.

15. The position measurement system according to Claim 14, wherein the light source has plural light sources which are different in emission wavelength or time-series emission pattern.

16. The position measurement system according to Claim 1, wherein the light source is a light reflecting member which reflects light from outside.

17. The position measurement system according to Claim 1, wherein the light receiving device is a digital camera having a focusing optical system.

18. A position determining system comprising:
a light source for emitting a light;
an optical system having a spherical aberration for forming a concentrated area of the light;
a detector that detects an information corresponding to the concentrated area; and
a calculator that determines a position of the light source based on the information.

19. The position determining system according to claim 18, further comprising a light diffusing member between the optical system and the detector.

20. The position determining system according to claim 18, further comprising a movable element, wherein the light source is mounted on the movable element.